RURAL—URBAN DIFFERENTIAL IN CONSUMTION AN EVIDENCE FROM KADUNA AND OYO STATES OF NIGERIA.

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1. Introduction

Rural-Urban polarisation is a world-wide phenomenon but the gap is far more prolonged in the developing economies. The causes of this rural-urban divergence can be seen as a failure of development policy implementations in general and the structure of the dual economy in particular.

Several attempts have been made to measure and propose remedial policies. Some of these have seen rural-urban dichotomy in infrastructural facilities imbalances (Tadaro, 1982 p. 408), migration (Mabogunje, 1970) and consumption pattern (Keneda, 1961).

Researchers have acknowledged the existence of rural-urban dichotomy in consumption, and several studies on the issue have often taken descriptive approach, concentrating on possible disparity in consumption patterns. To the best of our knowledge no efforts had been made to quantify the magnitude of the differential between the two sectors either by using aggregate or disaggregated data.

Thus, in this study, we are hypothesizing the existence of a differential in the standard of living between the rural and urban sectors; differential which can be one of the consequences of the rural-urban sectors; differential which can be one of the consequences of the rural-urban dichotomy. We intend to capture this divergence through a sectoral aggregate consumer expenditure used as an index of standard of living. Hence, the purpose of the paper is two fold. Firstly, evaluate the seemingly sectoral differential in the marginal propensity to consume, (MPC), and test the significance of demographic factors as determinant of consumption expenditure in both the rural and urban sectors of a given state. Secondly, envisage a test of homogeneity of consumption expenditure between the states under consideration.

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The model presented in the paper is an Extended Sectoral-Absolute Income Hypothesis, (ES-AIH), based tested on cross-section data of individual households in the states considered.

The paper is divided into five sections. Section 2 deals with the theoretical framework. In section 3, the empirical model is derived. Section 4 contains the estimations, results and discussions and section 5 gives the concluding remarks.

2. Theoretical Framework

The starting theoretical point for our work is the Absolute Income Hypothesis, A. I. H. According to this hypothesis, consumption is largely determined by current disposable income and changes in real income are translated reasonably quickly and fully into changes in consumption.

In general, empirical investigation of consumption function has been on time-series aggregate data or on cross-sectional data. Time series data have the merit of containing information on price variations and thus permit the estimation of price responses. (Musgrave et al., 1988). Cross-sectional data on the other hand do not contain adequate information on prices and hence cannot estimate price elasticities of demand. But the use of cross-section data can give insight into the effect of individual disposable income on consumption. In addition, the use of discrete (0, 1) variables rather than the observed quantity is facilitated.

Thus, we have incorporated demographic indicators into the AI. H. In addition, because we are testing for homogeneity of consumer demand function between sectors of a state, discrete or dummy variables are introduced into the model. In what follows, the model shall be denoted, Extended Sectoral-Absolute Income Hypothesis, (ES-AIH), model.

In constructing the model, let us assume that the representative individual consumer in a region seeks to maximise utility, U, where

$$U_{jk}=U(C_{jk}) \qquad \ldots \quad (2.1)$$

$j=1, \ldots, n$

$k=$Rural, Urban

such that $U'_{jk}>0$ and $U''_{jk}<0$. C_{jk} :

consumption of commodity j of an individual located in the rural or urban sector, k.

There exists durable and non-durable consumer goods and services in the economy on which consumers spend their income/wealth. We assume a one-good economy with data on total current value of expenditure on all goods and services, C_k, such that equation (2.1) becomes.

$$U_k=U(C_k) \quad \ldots \quad (2.2)$$

and

$$U'_k>0 \text{ and } U''_k<0$$

Optimisation of equation (2.2) as subject to current income and current accumulated wealth. Since we are dealing with a single time period analysis, lending or borrowing are assumed away. Hence the constraints can be written as

$$C_k=(fY_k, W_k) \quad \ldots \quad (2.3)$$

where Y_k is the current income, W_k, wealth and C_k aggregate consumption level. This equation contains a non-deterministic component, wealth. The latter is a stock of the present value of income flow measured at a certain rate over a certain period of time i. e.

$$W(t)=\sum_{t=1}^{T} Y_{tk}(1+r)^{-t} \quad \ldots \quad (2.4)$$

in a discrete case, or

$$W(t)=\int_0^T Y_k(t).\ e^{-rt}dt \quad \ldots \quad (2.4^1)$$

in a continuous case. Y is the current income, r is interest rate and t is time period. $W(t)$ is not directly observable and measurable. It includes expected flows that are yet unknown. These expected income flows must be forecast on the basis of things that are known, one important component of which is current disposable income provides good information to potential lenders on individual's ability to repay a loan and the interest on it. In effect it is difficult to borrow unlimited funds against future income. Hence, an individual may be constrained in the amount of consumption that can be undertaken by the level of current disposable income. (see Hayashi, 1985) It is in the light of the foregoing difficulties that we have restricted our analysis to the ES-AIH.

The maximization of equation (2.2) subject to equation (2.3) will yield the generally known demand fuuction which can be written as :

$$EX_i = f(Y_i) \quad \ldots \quad (2.5)$$

where EX_i, is the individual i's consumption expenditure and Y_i, is his current income. In the data used in the analysis, there are different categories of individuals by occupations : wage and non-wage earners. For a given individual wage earner, we assume that his consumption potentials depend on his pay packet i. e. curreent gross income minus taxe. In the case of a non-wage earner we hypothesize that his consumption is constrained by what he has after all dues have been payed. Hence, Y_i in equation (2.5) represent the current disposable income so that we have :

$$EX_i = f(Yd_i) \quad \ldots \quad (2.6)$$

Now, let us posit that for a given individual either located in Rural (R) or Urban (U) sector, his consumption expenditure is determined not only by his current disposable income, but also by other factors such as occupation, household size and sex. With this inclusion of new variables, equation (2.6) becomes

$$EX_i = f(Yd_i, OCC_i, HHS_i, SEX_i Z_i) \quad \ldots \quad (2.7)$$

where Yd_i, OCC_i, HHS_i, SEX_i and Z_i are current dispossable income, occupation, house-hold size, sex and other variables not explicitly specified such as education, respectively i^{th} individual.

Postulating that consumers behave in a similar manner, it is possible to construct a function which is additive across consumers. But the problem of aggregation will still exist. In effect it will be improper to suggest that all consumers are similar irrespective of their age or the size of the house-hold or sex or even location. In addition there is economy of scale in consumption. Further it is evident that the consumption of some types of commodites in a family depend on its composition. Commodity composition of consumer expenditure is beyond the scope of the present paper.

Since this paper envisages to shed some light on the differentials in consumption function between the rural and urban sectors, we would now rewrite equation (2.7) according to sectors so that :

$$EX_{iR} = f(Yd_{iR}, OCC_{iR}, HHS_{iR}, SEX_{iR}, Z_{iR}) \quad \ldots \quad (2.8)$$

and

$$EX_{iu}=f(Yd_{iu}, OCC_{iu}, HHS_{iu}, SEX_{iu}, Z_{iu}) \quad \ldots \quad (2.9)$$

Equations (2.8) and (2.9) are the rural and urban consumption expenditure function respectively.

The importance of the dummy variables as used in our ES-AIH model is twofold. First, help to indicate the existence of structural differences in consumption between the rural and urban sectors. Second, indicate how the various qualitative variables portioned into categories affect the consumption expenditure over all the observed individuals. Equations (2.8) and (2.9) are to be re-specified, taking note of the above explanations.

Hence, for the purpose of this study, occupation was categorised into four namely :

I : Highly Professional Workers (0, 1)

II : Semi-Professional and Worker (2, 3)

III : Farmers and related professionals (4, 5, 7, 8)

IV : Utilities workers (6, 9, X).

Note that the figures and letter X in brackets represent the Standard International Labour Classfication.

It then follows that we need three binary or indicator variables constructed thus :

$$OCC_{1i}=\begin{cases}1 & \text{if II}\\ 0 & \text{otherwise}\end{cases}$$

$$OCC_{2i}=\begin{cases}1 & \text{if III}\\ 0 & \text{otherwise}\end{cases} \quad \ldots \quad (2.10)$$

$$OCC=_{3i}=\begin{cases}1 & \text{if IV}\\ 0 & \text{otherwise}\end{cases}$$

For this variable the control category is the highly professional workers.

The variable HHS is divided into three categories. Hence, we need two binary variables :

$$HHS_{1i}=\begin{cases}1 & \text{between 5 and 8 members}\\ 0 & \text{otherwise}\end{cases}$$

$$HHS_{2i}=\begin{cases}1 & \text{above 8 members}\\ 0 & \text{otherwise}\end{cases} \quad \ldots \quad (2.11)$$

In this case the "Between 0 and less than 5" members category is the control category.

And finally, *SEX* is divided into two categories, male or female, and hence we need only one indicator variable defined as :

$$SEX_i=\begin{cases}1 & \text{if male}\\ 0 & \text{if otherwise}\end{cases} \quad \ldots \quad (2.12)$$

3. The Empirical Model

3. 1 The Model

Given equations (2.8) and (2.9) and with (2.10), (2.11) and (2.12), an explicit functional relationship between consumption expenditure and the explanatory variables can be derived.

The contention in the use of A. I. H. is that as income increases, consumption, on the average, will increase but not by as much as the increase in income. This implies that the MPC will fall as income rises suggesting that the consumption function is non-linear in the explanatory variables. This conclusion is justifiable especially in a cross section analysis of consumption function. In a time series short-run analysis, where we are disposed with aggregate consumption and aggregate disposable income, the functional relationship as explicitly linear suggesting a constant MPC but a declining average propensity to consume, APC, as income increases. Hence, we posit an explicit non-linear functional relationship between the consumption expenditure and the various explanatory variables for both the rural and urban dwellers, of the form :

$$EX_{iR}=a_{oR}Yd_{Ri}^{a1}.exp\left[\sum_{j=3}^{5}ajOC_{jiR}+\sum_{k=6}^{7}a_kHHS_{kiR}+a_8SEX_{iR}\right].V_{iR} \quad \ldots \quad 3.1$$

and

$$EX_{iu}=b_{ou}Yd_{iu}^{b1}.exp\left[\sum_{j=3}^{5}b_jOC_{jiu}+\sum_{k=6}^{7}b_kHHS_{kiu}+b_8SEK_{iu}\right].V_{iu} \quad \ldots \quad 3.2$$

where exp is the exponential function and the V_i's are the stochastic random term assumed to be multiplicative.

Given equations (3.1) and (3.2), we can test for equality in consumption function between the rural and urban sectors. Recall that the functions include both qualitative and quantitative variables, hence the test can be carried out along these different characteristics. The essence of the test is to evaluate the existence of shifts in the consumption function, differential in the MPC, and/or differential in the contribution of the various demographic factors to the sectoral consumption expenditure.

In testing these hypothesis, it is usual in econometric analysis to use "chow" test. But by pooling the cross-sectional observations over the two sectors, similar equility tests could be carried out without the use of chow test. Pooling the data has an additional advantage of tncreasing the degree of freedom of the regression and hence a more efficient estimator.

Now let us combine equations (3.1) and (3.2) into a single equation.

$$EX_i = a_o e^{(b_o - a_o)\, DC_i} \cdot Yd_i^{a_i}\, DYd_i^{b_i - a_1} \cdot exp$$

$$\left[\sum_j \left(a_j\, OC_{ji} + (b_j - a_i)\, DOC_{ji} \right) \right.$$

$$+ \left(\sum_k (a_k HS_{ki} + (b_k - a_k)\, DHS_{ki} \right) + a_s SEX_i +$$

$$\left. + (b_s - a_s)\, DSEX_i \right] \cdot V_i \qquad \ldots \quad (3.3)$$

Equation (3.3) can be rewritten more compactly as :

$$EX_i = de^{C_o DC_i} \cdot Yd_i^{C_1}\, DYd_i^{C_2} \cdot exp \left(\sum_j (c_j OC_{ji} + d_j DOC_{ji}) \right.$$

$$+ \sum_k (c_k HS_{ki} + d_k DHS_{ki} + c_s SEX_i$$

$$\left. + d_s DSEX_i \right) \cdot V_i \qquad \ldots \quad (3.4)$$

where, for the purpose of identification of parameters between equations (3.3) and (3.4)

$$d = a_o$$

$$C_o = b_o - a_o$$

$$C_1 = a_1$$

$$C_2 = b_1 - a_1$$

$C_j=a_j$ and $d_j=b_j-a_j$, $j=1, 2, 3$

$C_k=a_k$ and $d_k=b_k-a_k$, $k=1, 2.$

$C_8=a_8$

$d_8=b_8-a_8$

For the purpose of estimation, equation (3.4) is linearized to, give :

$$L_nEX_i=Z+c_oDC_i+c_1L_nYd+c_2L_nDYd_i+\sum_j(c_jOC_{ui}+d_jDOC_{ji})+\sum_k(c_kHS_{Ki}+d_kDHS_{ki})+c_8SEX_i+d_8DSEX_i+w_i \quad \ldots (3.5)$$

where $z=Lnd$

$w_i=\text{Ln } V_i$ and $E(w_i)=0$, $E(w_iw_i)=0$

if $i\neq j$ and $E(w_iw_j)=\sigma_w^2$ if $i=j$

3.2 The Data

The cross-section data for the study came from the National Integrated Survey of Household (NISH) programme conducted by the Federal office of Statistics in August 1985. The survey collected detailed information for income, consumer expenditure and some socio-economic characteristics for that year. The data were collected over both the rural and urban sectors. In that survey rural area is defined as any region distinct on its own with less than 20,000 people while an urban area is a distinct region having at least 20,000 inhabitants.

Consumption is that part of income that is not saved but goes as consumption expenditure. Consequently, we assume that consumption as observed in the survey is the actual purchases of consumer goods and services. In addition, income is the monetary estimate of money income and income in kind. In effect, in an economic system such as ours, where social security allocation is non-existent or quasi-existent, income in kind may constitute a substantial supplementary income for many individuals.

The different classification into categories of household size and occupation is ours. But we observed that the occupation of the majority of the individuals interviewed fell within the third and fourth categories (see equation (2.12).

The variables used in the analysis are as follows :

EX_{iR}=expenditure of individual i in the rural sector

EX_{iu}=expenditure of individual i in the urban sector

EX_i=expenditure of individual i in a given state

OC_{jiR}=occupational category of individual i, in the rural sector

OC_{jiu}=occupational category of individual i, in the urban sector,

OC_{ji}=occupational category of individual i in a given state.

HS_{kiR}=Household size of individual i in rural area

HS_{kiu}=Household size of individual i in urban area

HS_{ki}=Household size of individual i in a given state

SEX_{iR}=Sex of individual i in rural area

SEX_{iu}=Sex of individual i in urban area

SEX_i=Sex of individual i in a given state

Yd_{iR}=current disposable income of individual i in rural area.

Yd_{iu}=Current disposable income of individual i in urban area.

Yd_i=current disposable income of individual i in a given state.

DYd_i=Special binary variable. It takes the value 0 for all rural disposable income and the observed values for all urban disposable income. It is meant to detect if there is differential between the MPC in the rural and urban equations.

DC_i=Binary variable to capture the intercept differential between rural and urban sectors.

DOC_{ji}=Discrete (0,1) variables to capture the differential between sectors, given an occupational category.

DHS_{ki}=Discrete (0,1) variables designed to capture the differential between sectors, given the household size.

$DSEX_i$=Discrete (0,1) variable to capture the differential between sectors, given the sex of the individual i.

The definition and the predictions on the parameters used in the model are as follows :

Z=constant term with $z>0$

C_0=intercept differential such that $C_0>0$

C_1=income elasticity of demand such that $C_1<1$.

C_2=differential income elasticity with $C_2 \gtrless 0$

C_j=occupation coefficients with $C_j>0$

C_k=household size coefficients with $C_k>0$

C_s=coefficient of sex variable, with C_s undetemined a priori.

d_i=occupation differential coefficients, with $d_j \gtrless 0$

d_k=household size differential coefficient $d_k \gtrless 0$

d_s=sex differential coefficient such that $d_s \gtrless 0$.

4. Estimations, Results and Discussions

4.1 Estimations

The estimated model is given by equation (3.5). Cross-sectional data for a sample of two states of the federation were employed to test the model. The data were available on rural and urban bases but were pooled to "improve the relative precision of the estimated parameters", (Gujarati, 1979).

Equation (3.5) was first estimated. Except for z and c_1, all other coefficients could not be said to possess the desirable properties of good estimators. The poor result may be due to the nature of the model. In effect, due to the small variations in the transformed values of EX_i, Yd_i and DYd_i, the estimate of c_2 (i. e. differential income elasticity) in particular may be very close to zero, and hence the inability of our model to effectively capture the magnitude of rural-urban differential.

In view of this, we have respecified equation (3.5), hypothesizing a linear relationship between the dependent variable, EX_i, and the independent variables. (see Pollak et al. 1978). In this case, the logarithmic transformation is no longer valid; and therefore the coefficients c_1 and c_2 now directly measure the MPC and the differential MPC respectively.

Given the nature of the data with which the model is to be tested, it is most likely that we have the problem of heteroscedasticity. Though the presence of the latter does not alter the unbiasedness and consistency properties of the coefficients, the fact that they (the coefficients) are inconsistent may suggest that "the standard tests of significance may not strictly hold and the predictive nature of the model may severely be restricted". (Alonzo, 1979). One could have envisaged an improvement on the estimations but for higher cost of the procedure involved in terms of data computations. Hence the results presented in this study should be considered as a first approximation, and the inferences made are tentative.

4.2 Results

The OLS result of the aggregate consumption function for KADUNA state is presented in equation (4.1). The rural and urban

$$+14.6640\ OC3_i + 6.1177\ HS1_i + 8.3040\ HS2_i$$
$$(16.6213) \qquad (10.4587) \qquad (14.6737)$$
$$+21.4645\ SEX_i + 27.5330\ DOC1_i + 2.8162\ DOC2_i$$
$$(13.5302) \qquad (40.4959) \qquad (22.8819)$$
$$+16.6806\ DOC3_i + 26.1951\ DHS1_i + 42.5324\ DHS2_i$$
$$(21.6454) \qquad (15.1737) \qquad (20.0591)$$
$$-22.4997\ DSEX_i$$

$R^2 = 0.6977$

$R^{-2} = 0.4904$

$n = 350$ ... (4.4)

$$EX_{iR}^{OY} = 63.4024 + 0.5356\ YD_{iR} - 11.9361\ OC1_{iR}$$
$$-4.6503\ OC2_{iR} + 14.6640\ OC3_{iR}$$
$$+6.1177\ HS1_{iR} + 8.3040\ HS2_i$$
$$21.4645\ SEX_{iR} \qquad \text{... (4.5)}$$

$$EX_{iu}^{OY} = 29.0078 + 0.7451\ Yd_{iu} - 39.4691\ OC1_{iu}$$
$$-1.8441\ OC2_{iu} - 2.0166\ OC3_{iu}$$
$$+32.3128\ HS1_{iu} + 50.8364\ HS2_{iu}$$
$$-1.0352\ SEX_{iu} \qquad \text{... (4.6)}$$

4.3 Discussions

Equations (4.1) and (4.4) are statistically good. With R^{-2} of about 55% and 49% respectively, one could accept that the explanatory power of ES-AIH model is good enough given the number of dummy variables included in the model.

In equation (4.1), (Kaduna state), all coefficients have the predicted signs except c_5. The standard errors indicate statistical significance at the 5% level for 10 of the 15 parameters including the dummy variables. These estimates suggest the following.

First, there appears to be a significant difference in the marginal propensity to consume (MPC), between the rural and urban sectors of Kaduna state. The magnitude of the differential is −0.1594, thus suggesting that the MPC of the rural dwellers is higher than that of the urban dwellers.

Second, there is a shift in the consumption functions between the two sectors estimated at naira 15.8054. This estimate is statistically

insignificant, hence we may assume equality of autonomous consumption. But given that this coefficient is negative, we can infer that the level of autonomous consumption is higher in the rural than the urban area. This justification could be obtained from equations (4.2) and (4.3).

Third, the categorical occupational variables, CC1 and OC2, were not statistically significant but they have the expected signs. The variables OC3 whose coefficient is statistically significant tend to show an inverse relation with the consumer expenditure. But the coefficients of DOC2 and DOC3 are very significant suggesting a differential between the two sectors. Thus, an individual i, located in the urban area will spend naira 31.2 if in the III occupational category or naira 76.3 if in the IV occupational category than an individual located in the rural area.

Similarly, the estimates of c_6, c_7, d_7 are significantly different from zero in the statistical sense. Not only do they show that household size is an important factor in determining consumer expenditure but also that there is sectoral differential. It costs about naira 24.1 on the average, monthly, to maintain a family of eight or more in the urban areas than in the rural areas of Kaduna state.

Finally, the discrete sex variable is responsive to the model. In effect, given that the individual is male will raise consumption expenditure by naira 17.50 relative to female. But the sectoral differential tend to suggest the opposite which may infer that the attribute female influences consumption expenditure in the rural than in the urban areas.

Overall, the estimated ES-AIH model tend to confirm the existence of differential consumption function between the rural and urban sectors of Kaduna state. The estimates suggest that MPC in the rural area is greater than the MPC in the urban area which corroborates keynesian consumption predictions.

As for OYO state, equation (4.4), of the 15 coefficients only 4 are significant at the level of 0.05. A look at the qualitative variables first. Except the estimate of d_6 and d_7 all other coefficients are non significant, c_3 and c_4 even carry wrong signs which violates the predictions on the coefficients. But since they are not significant, we may assume that the problem is not serious. There are no collinearity between the different categorical occupational variables and the income variables. The estimates of d_6 and d_7 suggest a sectoral difference in the relationship between consumption expenditure and household size.

The estimate of the shift coefficient, c_0, tend to show that there is no differential in the autonomous consumption. It however indicates that the level is higher in the rural area than in the urban area.

The estimate of c_2 indicates the existence of a structural difference in the MPC between the rural and urban sectors of OYO state. The calculated value of 0.7451 and the estimated value of 0.5356 show that the MPC is higher in the urban than in the rural area. This contradicts our theoretical expectation. The explanation may be found in the nature of the data used in the study. In effect, majority of the individuals interviewed in the survey fell within the II and IV occupational category (i. e. farmers and related professional and the utilities workers). It may be that individuals in both sectors are exercising similar consumption behaviour i. e. the double–dualism phenomenon. In such a case the rural formal sector may be exercising the same behaviour as the urban formal sector and ditto for the rural informal and urban informal sectors. Consequently, because of the effect of non-market-determined earning (income in kind) that adds up to the market-determined earnings in the rural areas of the state, it may be expected that the MPC in the rural sector will be less than the MPC in the urban area. Bargaining power of a utility worker located in the rural areas may be higher than that of a similar utility worker located in the urban area because the former may dispose some essential commodities which the latter will obligatorily have to purchase under market conditions.

5. Concluding Remark

Our analysis in this paper is restricted to investigating the determinants of consumption at a point in time and no attempt is made for a dynamic analysis. The model provided a tentative estimation of the parameters which should be seen as approximations.

Based on the data sets and the estimation technique employed, our empirical work indicates that our ES-AIH model captures rural-urban imbalance in consumption both statistically and quantitatively. It confirms this existence of the rural-urban phenomenon in both Kaduna and Oyo states. But the degree of determination of the variables varies between the states.

Secondly, the analysis shows that household size and sex, classified into categories determine consumption expenditure in Kaduna state, but to a lesser extent in Oyo state. In addition occupation appears not to influence expenditure in none of the states. We suspected that the

income variable must have served as proxy for the occupational variables.

Thirdly, the differential in the MPC between rural and urban sectors of both states load support to the view that rural-urban dichotomy extsts from the premise of consumption expenditure. The magnitude of the differentials are 16% and 21% in Kaduna and *Oyo* states respectively. These values suggest the relative magnitudes of the disparity between the sectors of the states and thus call for public policy measure to reduce the gap.

In addition, the study indicates possible existence of double-dualism in *Oyo* State.

And finally, it appears that feminine attribute affect consumption expenditure more significantly in the rural than in the urban sector.

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